



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,339	12/15/2003	Rajesh K. Saini	2001-IP-005484U1P1	3700
71407	7590	11/04/2010		
ROBERT A. KENT P.O. BOX 1431 DUNCAN, OK 73536			EXAMINER LIGHTFOOT, ELENA TSOY	
			ART UNIT 1715	PAPER NUMBER
			NOTIFICATION DATE 11/04/2010	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ROBERT.KENT1@HALLIBURTON.COM
Tammy.Knight@Halliburton.com

Office Action Summary	Application No. 10/736,339	Applicant(s) SAINI ET AL.	
	Examiner ELENA Tsoy LIGHTFOOT	Art Unit 1715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 29, 2010 has been entered.

Status of the Claims

Claims 42-61 are pending in the application. Claims examined on the merits are 42-61.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 60 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 60 recites "partially fatty acid ester" in line 4 and "polyethylene adipate)disterate" in line 9 the meaning of which is not clear. For examining purposes the phrases was interpreted as "partially esterified fatty acid ester" and "polyethylene adipate/distearate".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 1715

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 42-48, 55-59 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (US 6,209,643) in view of Lee et al (US 6,817,414) and Still et al (US 7166560).

Nguyen et al discloses a method for treating a subterranean formation and uniformly delivering a controlled release of a treatment chemical to the formation (See column 3, lines 29-35), the method comprising the steps of providing a fluid suspension including a *mixture* of a particulate, a tackifying compound and a *treatment chemical*, which **may be** in particulate form or **coated** upon (i.e. coated on the particulate) or in a substrate (See column 3, lines 43-44); pumping the suspension into a subterranean formation and depositing the mixture within the formation (See Abstract). The fluid suspension is made by mixing particulate material such as conventional *proppants or gravel* packing materials (See column 4, lines 4-7), with a liquid or solution of a tackifying compound in a solvent (See column 5, lines 10-13) such as **alcohol** (See column 5, lines 55-56). The tackifying compound **coats** at least a portion of the particulate *upon admixture therewith*, a treatment chemical which may be in particulate form or coated upon and, optionally, a hardenable resin, coats or is coated upon at least a portion of the particulate (See column 3, lines 43-46). The presence of the tackifying compound on the particulate causes the treatment chemical containing or coated particles to adhere to and remain dispersed within the coated particulate both **during mixing**, introduction into the formation and upon placement therein (See column 4, lines 56-60).

As to acid-releasing degradable material, Nguyen et al teaches that the treatment chemical may comprise gel breakers, such as **oxidizers, enzymes or hydrolyzable esters** that

Art Unit: 1715

are capable of **producing a pH change** in the fluid, or substantially any other chemical which is soluble in the fluids in the formation at the temperature conditions within the formation within which it is placed (See column 4, lines 40-43). Gravel packing treatments generally are performed at lower rates and pressures whereby the fluid can be introduced into a formation to create a controlled particle size pack surrounding a screen positioned in the wellbore where fracturing of the formation may or may not occur (See column 8, lines 20-25). The particulate pack surrounding the wellbore then functions to prevent fines or formation particulate migration into the wellbore with the production of hydrocarbons from the subterranean formation (See column 8, lines 25-28). The treatment chemical then is dissolved by the fluids present in the formation to provide the desired treatment. (See column 8, lines 28-33).

Nguyen et al fails to teach that the treatment chemical comprises an acid-releasing degradable material selected from the group consisting of poly(orthoester); a lactide, a poly(lactide); a glycolide; a poly(glycolide); a poly(ϵ -caprolactone); a poly(hydroxybutyrate); a substantially water insoluble anhydrides; a poly(anhydride); a poly(amino acid); a copolymer of two or more of the above-listed compounds; and any combination thereof (Claim 42).

Lee et al teaches that in order to be able to fill the annular space with sand completely and successfully, the hydrocarbon-bearing formation should have been previously covered with a thin layer of firm and impermeable filter cake formed by the reservoir drilling fluid (See column 1, lines 29-34). After the gravel pack sand has been successfully placed, the filter cake existing between the gravel pack sand and the formation needs to be removed before the flow of hydrocarbon is initiated (See column 1, lines 37-43). To destroy the filter cake that is now behind the gravel pack sand, *various chemicals, breakers* and mechanical devices have been developed

Art Unit: 1715

and used (See column 1, lines 44-46). For example, hydrochloric acid is often delivered by a separate operation to soak the gravel pack sand and filter cake with the aid of wash cups (See column 1, lines 46-48) to destroy a large amount of the acid-soluble and acid-breakable components in the filter cake (See column 1, lines 51-55). The mechanical wash cups attached to the end of a work string must be picked up at the surface and lowered to the bottom through the inside of the screen, and the hydrochloric acid is then pumped through the gravel pack sand *repeatedly* (See column 1, lines 49-53). Other breakers, such as ***oxidizers and enzymes***, may also be delivered to destroy oxidizer- and enzyme-breakable organic components in the filter cake, such as starch polymers (See column 1, lines 56-58). However, these breakers are considered less efficient in several ways: first, they are not effective in destroying acid-soluble and acid-breakable inorganic components in the filter cake, such as calcium carbonate; second, many oxidizing breakers have compatibility issues with certain brines; and third, in addition to brine compatibility issues, most enzyme breakers will lose reactivity in highly concentrated divalent brines, and at temperatures above 200⁰ (See column 1, line 58 to column 2, line 6). Thus, there exists an on-going need and desire for breakers which provide a slow release mechanism to initiate the disintegration of filter cakes so that gravel pack operations can be continued (See column 2, lines 44-49). It was found that replacing conventional gravel pack sand typically used for gravel packing by polymerized *alpha-hydroxycarboxylic acid coated proppants* such as polyglycolic-acid-coated sand, provides under downhole conditions, the acidic by-product generated from the hydration of polyglycolic-acid-coated sand that can break down acid-soluble and/or acid-breakable components embedded in the filter cake thereby enhancing the filter cake removal (See column 2, lines 51-64). In short, **Lee et al** teaches that replacing conventional

Art Unit: 1715

gravel pack sand typically used for gravel packing by polymerized *alpha-hydroxycarboxylic acid coated proppants* such as **polyglycolic-acid-coated sand**, provides under downhole conditions, the acidic by-product generated from the hydration of polyglycolic-acid-coated sand that can break down acid-soluble and/or acid-breakable components embedded in the filter cake thereby enhancing the filter cake removal (See column 2, lines 51-64).

Still et al teaches that two methods of removing filter cake are known in the art: (1) a method of pumping an acidic fluid from the surface and down the wellbore above fracture pressure for to provide flow path in a filter cake (See column 1, lines 17-29); and (2) a second method providing delay formation of the acid by the hydrolysis of **esters** such as methyl formate and methyl acetate as in situ acid generators in the oilfield as described by Templeton, et al., in "Higher pH Acid Stimulation Systems", SPE paper 7892, 1979. However, the first method generally has two major problems encountered during this normal procedure: first, acid corrosion of iron-containing components of the wellbore such as casing, liner, coiled tubing, etc. (See column 1, lines 30-32); and second, the acid will naturally react with the first reactive material with which it comes into contact which may be a filter-cake, may be the formation surface forming the wall of an uncased (or openhole) wellbore, may be the near-wellbore formation, or may be a portion of the formation that has the highest permeability to the fluid, or is in fluid contact with a portion of the formation that has the highest permeability to the fluid (See column 1, lines 42-62); and in the second method, ester acid precursors are liquids, and these reactions take place very rapidly as soon as the acid precursors contact water (See column 2, lines 23-25). There is a need for a new method of delayed, controlled release of acids from solids in situ in acid fracturing (See column 2, lines 26-27). The use of a solid acid-precursor such as lactide,

Art Unit: 1715

glycolide, polylactic acid (**polylactide** –see column 3, lines 29-31), *polyglycolic acid* (**polyglycolide** –see column 3, lines 33-35), a copolymer of polylactic acid and polyglycolic acid, a copolymer of glycolic acid with other hydroxy-, carboxylic acid-, or hydroxycarboxylic acid-containing moieties, a copolymer of lactic acid with other hydroxy-, carboxylic acid or hydroxycarboxylic acid-containing moieties, or mixtures of the preceding provides a desired controlled release of acid by hydrolysis and dissolution (See column 2, lines 31-40). In short, **Still et al** teaches that the use of claimed *lactide*, *glycolide*, polylactic acid (polylactide –see column 3, lines 29-31), *polyglycolic acid* (polyglycolide –see column 3, lines 33-35), a copolymer of polylactic acid and polyglycolic acid, a copolymer of glycolic acid with other hydroxy-, carboxylic acid-, or hydroxycarboxylic acid-containing moieties, a copolymer of lactic acid with other hydroxy-, carboxylic acid or hydroxycarboxylic acid-containing moieties, or mixtures of the preceding provides a desired controlled release of acid by hydrolysis and dissolution (See column 2, lines 31-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polylactide, polyglycolide as a treatment chemical in Nguyen et al instead of oxidizers, enzymes or hydrolyzable esters that are capable of producing a pH change with the expectation of providing the desired controlled release of acid by hydrolysis, as taught by Lee et al and Still et al, and since Nguyen does not limit its teaching to particular acid-releasing degradable material.

As to an acid-releasing degradable material being introduced as a coating solution in a solvent or plasticizer, Nguyen teaches that the treatment chemical may be either *absorbed or coated* upon or in a substrate (See column 3, lines 43-44), the substrate being porous or non-

Art Unit: 1715

porous (which may or may not function as a proppant or gravel pack material) or even particulates or agglomerates of particles of a desired solid treatment chemical (See column 4, lines 31-36). In other words, Nguyen et al teaches that the treatment chemical may be introduced into a treating fluid *either* as a solid particulate *or* in its dissolved form as a liquid solution of the solid treatment chemical in a solvent. Thus, introducing the treatment chemical in a *particulate* form in Nguyen et al is OPTIONAL.

Nguyen et al further teaches that a liquid or solution of a tackifying compound is incorporated in an intimate mixture (i.e. as a substantially uniform dispersion of the components in the mixture) with a particulate material such as conventional proppants or gravel packing materials together with an optional hardenable resin and introduced into a subterranean formation (See column 4, lines 3-15). The liquid or solution of tackifying compound and hardenable resin generally are incorporated with the particulate in any of the conventional fracturing or gravel packing fluids comprised of an aqueous fluid, an aqueous foam, a hydrocarbon fluid or an emulsion, a viscosifying agent and any of the various known *breakers*, buffers, surfactants, clay stabilizers or the like (See column 7, lines 56-62). The uniform dispersion of the components is made by mixing the proppants or gravel packing materials with a liquid or solution of a tackifying compound (See column 4, lines 4-7; column 8, lines 8-12) in a solvent (See column 5, lines 10-13) such as alcohol (See column 5, lines 55-56). The treatment chemical may be introduced in a *similar* manner (i.e. the treatment chemical may be introduced as a **solution** in a suitable solvent) (See column 8, lines 12-15). Moreover, incorporation of a carrier or diluent was held to have been obvious. *In re Lerner* 169 USPQ 51 (CCPA 1971); *In re Rosicky* 125 USPQ 341 (CCPA 1960).

Art Unit: 1715

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have introduced a solid water-insoluble treatment chemical in Nguyen et al in view of Lee et al and Still et al as a solution of the solid treatment chemical in a suitable solvent with expectation of providing the desired absorption or coating of the treatment chemical on proppant, as taught by Nguyen et al, since Nguyen et al does not limit its teaching to particular treatment chemical.

As to claimed on-the-fly coating, Nguyen et al teaches that in a mixture of a proppant, a liquid or solution of a tackifying compound, a solution of a treatment chemical and, optionally, a hardenable resin, the tackifying compound coats at least a portion of the proppant ***upon admixture*** therewith (See column 3, lines 40-46). Obviously, the treatment chemical mixed with the tackifying compound would also be coated on the proppant together with the tackifying compound ***upon admixture*** with the proppant, i.e. on-the -fly.

As to claimed solvent of claims 46-47, obviously, one of ordinary skill in the art would use a conventional alcohol such as methanol and isopropanol as a solvent in Nguyen et al because Nguyen et al does not limit their teaching to particular alcohols.

As to claim 47, plasticizers were not addressed because they are *optional*.

As to claims 48 and 61, poly(orthoester) is not addressed because it is *optional*.

As to claim 55, It is the Examiner's position that a solvent suitable for dissolving a solid chemical treatment polymer of Lee et al and Still et al would make the chemical treatment polymer in a fracturing fluid more flowable, and thus, would read on claimed **plasticizer**, as described in the Applicants' specification (See page 6, lines 4-5). If it could be argued that the

Art Unit: 1715

solvent reads on claimed plasticizer, it is the Examiner's position that plasticizer is commonly used as an additive in fracturing fluids*.

5. Claims 42-48, 55-59 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, as applied above, and further in view of Murphey et al (US 4,829,100).

If it could be argued that Nguyen et al does not read on claimed on-the-fly coating, Murphey et al teaches that particulate material utilized in the performance of packing procedures or as a proppant material in fracturing treatments (See column 9, lines 62-68) can be coated rapidly and continuously by admixing in a stream (on-the-fly) (See column 2, lines 37-42) instead of batch mixing which requires a period of time, e.g., at least about 15 minutes to several hours to obtain satisfactory coating of the particulate material before the slurry may be introduced into a placement zone (See column 2, lines 17-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coated gravel in the cited prior art on-the-fly with the expectation of providing the desired rapid and continuous coating, as taught by Murphey et al.

6. Claims 42-48, 55-59 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, as applied above, and further in view of McDougall et al (US 5,192,615).

The cited prior art fails to teach that the fluid suspension further comprises a plasticizer (Claims 42, 47, 49, 53, 55) that does not comprise starch (Claim 55).

McDougall et al teaches that generally a fracturing fluid comprises a viscous or gelled polymeric solution, a propping agent, a chemical breaker and other additives commonly used in

Art Unit: 1715

fracturing fluids (See column 2, line 65 to column 3, line 1), *friction-reducing* agents such as small amounts of high molecular weight linear polymers such as polyacrylamide or **alcohol** to reduce tension and resistance to return flow (See column 8, lines 7-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added a friction-reducing agent such as polyacrylamide or alcohol to the fluid suspension of Nguyen et al with the expectation of providing the desired reduced tension, as taught by McDougall et al.

7. Claims 42-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560 or over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, further in view of Murphey et al '100 or over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, further in view of McDougall et al '615, as applied above, and further in view of Mikos et al (WO 9425079A1).

The Examiner Note: for convenience, instead of WO 9425079A1, the Examiner will refer to US 6689608 of the same patent family.

Still et al teaches that excellent sources of acid that can be generated downhole when and where it is needed, i.e. "acid-precursors" with "delayed acid generation", are solid cyclic dimers, or solid polymers of certain organic acids, that hydrolyze under known and controllable conditions of temperature, time and pH to form the organic acids (See column 3, lines 19-25). One example of a suitable solid acid-precursor is the solid cyclic dimer of lactic acid (known as "lactide"), another is a polymer of lactic acid, (sometimes called a polylactic acid (or "PLA"), or a polylactate, or a polylactide) (See column 3, lines 25-37).

Still et al fails to teach that polymers which degrade in a controlled manner by hydrolysis include are selected from the group consisting of poly(orthoester); a poly(ϵ -caprolactone); a

Art Unit: 1715

poly(hydroxybutyrate); a substantially water insoluble anhydride; a poly(anhydride); a poly(amino acid); a mixture of one of the above-listed compounds; or a copolymer of two or more of the above-listed compounds and any combination thereof (Claim 49); or polyorthoester (Claims 48, 61).

Mikos et al teaches that a synthetic polymer which degrades in a controlled manner by hydrolysis include polyglycolic acid, polylactic acid, *polyorthoester*, *polyanhydride*, or copolymers thereof (See Abstract). It is well known in the art that all these polymers hydrolyze with release of an acid.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used polyorthoester or polyanhydride as a treatment chemical in the cited prior art instead of polyglycolic acid or polylactic acid with the expectation of providing the desired hydrolysis in a controlled manner (i.e. providing the desired controlled release of an acid), as taught by Mikos et al, since Still et al does not limit its teaching to particular acid-precursors.

8. Claims 42-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560 or over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, further in view of Murphey et al '100 or over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, further in view of McDougall et al '615 or over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, further in view of Mikos et al '079, as applied above, and further in view of Cooke, Jr. (US 20030060374)* and Schwartz et al (US 20030125215).

The cited prior art fails to teach claimed plasticizer such as polyethylene oxide, polypropylene glycols and polyethylene glycols.

Cooke, Jr. teaches that a degradable polymer such as polylactide (See column 7, lines 12-13) may be plasticized with a known plasticizing agent, such as a polyhydric alcohol, glycol or other relatively low molecular weight compound that mixes with the polymer to decrease its viscosity before it is placed in a wellbore. (See column 7, lines 21-25).

Schwartz et al teaches that polyethylene oxide, polypropylene glycols or polyethylene glycols are suitable for the use in fracturing fluids as friction reducing compounds (i.e. claimed plasticizers enhancing flow of the treating fluid) (See P70).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added polyethylene oxide, polypropylene glycols and polyethylene glycols to a fracturing fluid of the cited prior art with the expectation of providing the desired reduced viscosity and friction, as taught by Cooke, Jr. and Schwartz et al.

Response to Arguments

Applicant's arguments filed September 29, 2010 have been fully considered but they are not persuasive.

A Claims 42-48 and 55-60 over Nguyen in view of Lee and Still

i. The References Do Not Disclose the Claimed Coating Solutions that are Coated On-The-Fly

None of Nguyen, Lee, or Still disclose the following element in claim 42: "combining an acid-releasing degradable material with a solvent or a plasticizer to create a coating solution" that can be coated onto particulates "on-the-fly." And, with respect to claim 55, none of Nguyen, Lee, or Still disclose the following element: "combining an acid-releasing degradable material with a plasticizer to create a coating solution, with the proviso that the plasticizer does not comprise a starch" that can be coated onto particulates "on-the-fly." As Applicants understand from the

Art Unit: 1715

Advisory Action dated August 20, 2010, the Examiner is citing Lee and Still as evidence that acid-producing materials are known in the art and is citing Nguyen for the proposition that "treatment chemicals" can be combined with solvents under the theory that the tackifying compound in Nguyen "is the equivalent of the acid-releasing degradable material of the present application." And that, since Nguyen discloses that a liquid or solution of a tackifying compound can contain a solvent it therefore reads on the pending claims. See Advisory Action at 2. Applicants assert that such an approach vitiates the elements of the pending claims. Still discloses the use of acid-generating materials, such as PLA and PGA, for use in acid fracturing but is clear that only "solid acid-precursor" materials are suitable for the invention. See e.g. Still at Abstract, col. 3, II. 25-37, and col. 6, II. 9-12 (reciting the various suitable solid shapes for the disclosed "solid acid precursors"). Thus, at no point does Still disclose "combining an acid-releasing degradable material with a solvent or a plasticizer to create a coating solution." Still does not mention the use of a solvent in coating the sand, and does not mention the use of degradable materials in any form other than solid; thus Still does not teach the elements relating to mixing with a solvent or plasticizer or the element of on-the-fly coating as required by all pending claims. Moreover, each of the pending claims includes an element of "on-the-fly" coating of an acid-releasing degradable material onto particulates. Lee discloses gravel particulates coated with polymers that degrade to produce acids, such as PLA and PGA. See Lee at col. 3, II. 3-6. However, Lee teaches that in order to produce such coated gravel, one of two methods is used: (1) polymerize acid monomer in the presence of gravel at elevated temperature, followed by cooling, grinding, and sieving, or (2) polymerize acid monomer at elevated temperature and then stir in gravel while maintaining the elevated temperature, followed by cooling, grinding, and sieving. Neither of these methods is equivalent to the on-the-fly coating methods claimed in the present invention. Thus, Lee does not mention the use of a solvent in coating the sand and so does not teach the elements relating to mixing with a solvent or plasticizer or the element of on-the-fly coating as required by all pending claims. The Office Action then cites to Nguyen as evidence that because a liquid or solution of tackifying compound can contain a solvent, and that the claimed "treatment chemical" (acid-releasing degradable material) can be introduced in a similar manner. Final Office Action at 3. However, this is unrelated to the present case wherein a solid degradable material is made coatable through the use of a solvent or plasticizer. Nguyen is clear that the tackifiers are naturally liquid at down hole conditions and the only time they "may be solid" is at surface conditions. That is, Nguyen contemplates the potential use of a solvent in order to achieve a liquid state that is the natural state of the tackifier once placed down hole. By contrast, the present invention contemplates using a solvent or plasticizer to render a material that would otherwise be solid, even down hole, into a coatable form. The Applicants herein discovered that they could create such a coatable material that would continue to act as an acid-producer down hole even though it had already been rendered coatable. Thus, is it impermissible hindsight to combine the acid-releasing materials described in Lee and Still with the liquefied tackifying solutions of Nguyen. These references, taken together, do not disclose "combining an acid-releasing degradable material with a solvent or a plasticizer to create a coating solution" and then coating that solution "on-the-fly" as required by independent claim 42, or "combining an acid-releasing degradable material with a plasticizer to create a coating solution" and then coating that solution "on-the-fly" as required by independent claim 55. Thus, Nguyen, Lee, and Still cannot form a prima facie case of

Art Unit: 1715

obviousness with respect to claims 42 or 55. Accordingly, Applicants respectfully request withdrawal of this rejection with respect to claims 42-48 and 55-60.

The Examiner respectfully disagrees with this argument. As discussed above, Nguyen teaches that the treatment chemical may be absorbed or coated on the proppant or even may be in solid particulate form (i.e. introducing the treatment chemical into a treating fluid as a solid particulate is OPTIONAL) (See column 4, lines 31-36). Thus, in contrast to Applicants' assertion the treatment chemical may be introduced into a treating fluid *either* in solid particulate form *or* in liquid form in similar manner as a tackifying compound, i.e. in the form of a solution in a solvent. **Lee et al and Still** are secondary references which are relied upon to show that (*substantially water insoluble*) lactide, glycolide, polylactic acid (polylactide –see column 3, lines 29-31), polyglycolic acid (polyglycolide) are suitable for the use as an acid-releasing degradable material and provide the desired controlled release of acid by hydrolysis. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polylactide, polyglycolide as a treatment chemical in Nguyen et al instead of oxidizers, enzymes or hydrolyzable esters that are capable of producing a pH change with the expectation of providing the desired controlled release of acid by hydrolysis, as taught by Lee et al and Still et al, and since Nguyen does not limit its teaching to particular acid-releasing degradable material.

ii. Additional Rejections of Claims 48 and 55

With respect to dependent claim 48, the Examiner alleges that the limitation is optional. Applicants respectfully disagree. Specifically, the limitation is not optional because claim 48 requires the acid-releasing degradable material to comprise a poly(orthoester). While the acid-releasing degradable material must comprise at least one of the materials listed in the Markush group of claim 42, the additional limitation introduced in claim 48 requires that the acid-releasing degradable material comprise a specific material--namely a poly(orthoester) even if other materials are present. Thus, Applicants request that the limitation be given the proper patentable weight during prosecution.

The Examiner respectfully disagrees with this argument. Claim 42 requires at least one acid-releasing degradable material from listed Markush members. Thus, claim 42 does not require the presence of poly(orthoester) Markush member.

D. Claims 42-61 over Nguyen, Lee, and further in view of Mikos

Art Unit: 1715

As discussed above in Section II.A., the combination of Nguyen, Lee, and Still fails to establish that every limitation of independent claims 42, 49, and 55 was known in the prior art. Mikos fails to render obvious the deficiencies of Nguyen, Lee, and Still. Rather, the Examiner merely relied on Mikos for its alleged teaching that "a synthetic polymer which degrades in a controlled manner by hydrolysis include polyglycolic acid, polylactic acid, polyorthoester, polyanhydride, or copolymers thereof." See Office Action at 11. Applicants note that Mikos is directed towards medical applications. See Mikos Abstract. Thus, it is not surprising that Mikos does not disclose at least "combining an acid-releasing degradable material with a solvent or a plasticizer to create a coating solution" as required by independent claims 42 or 49, or "combining an acid-releasing degradable material with a plasticizer to create a coating solution" as required by independent claim 55. Claims 43-48, 50-54, and 56-61 depend, either directly or indirectly, from claims 42, 49, and 55 and therefore include all the limitations of those independent claims, respectively. Thus, claims 42-61 are patentable over the combination of Nguyen, Lee, Still, and Mikos. See 35 U.S.C. § 112 4 (2004). Accordingly, for at least these reasons, Applicants respectfully request withdrawal of this rejection with respect to claims 42-61.

The Examiner respectfully disagrees with this argument. Still et al teaches that excellent sources of acid that can be generated downhole when and where it is needed, i.e. "acid-precursors" with "delayed acid generation", are solid cyclic dimers, or solid polymers of certain organic acids, that hydrolyze under known and controllable conditions of temperature, time and pH to form the organic acids (See column 3, lines 19-25).

Mikos et al teaches that a synthetic polymer which degrades in a controlled manner by hydrolysis include polyglycolic acid, polylactic acid, *polyorthoester*, *polyanhydride*, or copolymers thereof (See Abstract). It is well known in the art that all these polymers hydrolyze with release of an acid. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used polyorthoester or polyanhydride as a treatment chemical in the cited prior art instead of polyglycolic acid or polylactic acid with the expectation of providing the desired hydrolysis in a controlled manner (i.e. providing the desired controlled release of an acid), as taught by Mikos et al, since Still et al does not limit its teaching to particular acid-precursors.

Therefore, it is irrelevant whether or not a synthetic polymer of Mikos et al which degrades in a controlled manner by hydrolysis include polyglycolic acid, polylactic acid, *polyorthoester*, *polyanhydride*, or copolymers thereof is used for the purpose different than medical applications as long as the polymer is capable of degrading by hydrolysis in a controlled manner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELENA Tsoy LIGHTFOOT whose telephone number is (571)272-1429. The examiner can normally be reached on Monday-Friday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy Lightfoot, Ph.D.
Primary Examiner
Art Unit 1715

November 2, 2010

/Elena Tsoy Lightfoot/